CLAIMS

1. A condensation heat exchanger, which comprises two coaxial tube bundles (2a, 2b), one of which acts as primary exchanger and the other of which acts as secondary exchanger, each of these bundles consisting of a tube or of a group of tubes arranged end-to-end, forming a helical coil, in which the wall of the tube(s) is produced from a material that is a good conductor of heat and has a flattened, oval cross section, the major axis of which is perpendicular or approximately perpendicular to the axis (X-X') of the helix, while the width of the gap separating two adjacent turns is constant and, particularly, smaller than the thickness of said cross section, said bundles (2a, 2b) being mounted securely inside a gas-impermeable jacket (1), means being provided in order to circulate at least one fluid to be heated, such as cold water, inside the tube(s) forming said bundles (2a, 2b), said jacket (1) having a gas-evacuation sleeve (122), the exchanger being arranged in such a way that a first hot gas - called principal hot gas - is let into said jacket (1) and channeled therein in such a manner that it flows radially, or approximately radially, through said bundles, passing through the gaps separating its turns, a deflection system (7) also being interposed between these two bundles and arranged in such a manner that this principal hot gas first flows through the primary exchanger (2a), passing between the gaps separating its turns from the inside to the outside, then flows through the secondary exchanger (2b), passing between the gaps separating its turns from the outside to the inside, after which it is evacuated to the outside via said sleeve (122), characterized in that, on the one hand, said deflection system (7) is composed of two plates (7a, 7b) called deflection plates, produced from a thermally insulating material, and in that, on the

other hand, it includes means for introducing a second hot gas - called additional hot gas - inside said jacket (1) between the two thermally insulating deflection plates (7a, 7b) and to channel it such that it flows directly, radially or approximately radially, through the secondary exchanger (2b), passing between the gaps separating its turns from the outside to the inside, either alone or at the same time as the principal hot gas that has already flown through the turns of the tube bundle (2a) acting as primary exchanger, after which it is evacuated to the outside via said sleeve (122).

2. A condensation heat exchanger, associated with a gas or fuel-oil burner (6), which comprises two coaxial tube bundles (2a, 2b) placed end-to-end, one of which acts as primary exchanger and the other of which acts as secondary exchanger, each of these bundles consisting of a tube or of a group of tubes arranged end-to-end, forming a helical coil, in which the wall of the tube(s) is produced from a material that is a good conductor of heat and has a flattened, oval cross section, the major axis of which is perpendicular or approximately perpendicular to the axis (X-X') of the helix, while the width of the gap separating two adjacent turns is constant and, particularly, smaller than the thickness of said cross section, said bundles (2a, 2b) being mounted securely inside a gas-impermeable jacket (1), means being provided in order to circulate at least one fluid to be heated, in particular cold water, inside the tube(s) forming said bundles (2a, 2b), said jacket (1) having a burnt-gas-evacuation sleeve (122), the exchanger being arranged such that the hot gases generated by the burner (6) flow radially, or approximately radially, through said bundles, passing through the gaps separating its turns, a deflection system (7) also being interposed between these two bundles and arranged in such a manner that the hot gases generated by the

burner first flow through the primary exchanger (2a), flowing through the gaps separating its turns from the inside to the outside, then the secondary exchanger (2b), flowing through the gaps separating its turns from the outside to the inside, after which they are evacuated to the outside via said sleeve (122), characterized in that, on the one hand, said deflection system (7) is composed of two plates (7a, 7b), called deflection plates, produced from a heat-refractory, thermally insulating material, for example based on ceramics, centered on said axis of the helix (X-X'), arranged in parallel, side-by-side, with a certain spacing, and one (7a) of which closes one side of the tube bundle (2a) acting as primary exchanger, while the other closes the adjacent side of the tube bundle (2b) acting as secondary exchanger, and in that, on the other hand, the wall of the jacket (1) is penetrated by a line (8) fitted to convey an additional hot gas from the outside to the inside of the jacket (1), into the space (Ω) between these two plates (7a, 7b) such that this hot gas can flow through the gaps separating the turns of the tube bundle (2b) acting as secondary exchanger from the outside to the inside, either alone or at the same time as the hot gases generated by the burner that have already flowed through the turns of the tube bundle (2a) acting as primary exchanger, after which they are evacuated toward the outside via said sleeve (122).

3. The heat exchanger as claimed in claim 1 or 2, characterized in that said deflection plates (7a, 7b) are disks each fixed coaxially to the end of a bundle (2a, 2b, respectively) so as to block off the inner space thereof in a gastight manner.

4. The heat exchanger as claimed in one of claims 1 to 3, characterized in that said deflection plates (7a, 7b) are connected together by spacers (700).

5. The heat exchanger as claimed in one of claims 1 to 4, characterized in that the inner space of the tube bundle (2a) acting as primary exchanger is blocked off at one end by one (7a) of said deflection plates and, at its other end, by a door (4) fixed to the façade of the exchanger, this door being penetrated by the burner (6) and integral with the latter.

6. The heat exchanger as claimed in one of claims 1 to 5, characterized in that the inner space of the tube bundle (2b) acting as secondary exchanger is blocked off at one end by one (7b) of said deflection plates and, at its other end, by the rear wall (12) of said jacket (1).

7. The heat exchanger as claimed in one of claims 1 to 6, the jacket of which is made from plastic while the line (8) fitted in order to convey a hot gas from the outside of the exchanger to the inside of the jacket (1), in the space between these two plates (7a, 7b), is made from metal, characterized in that the end wall (13) of said jacket (1) has an opening for the passage and for holding said metal (8), and in that this opening has a rim (131) turned toward the inside of the jacket (1), this line (8) being fixed to said rim (131) by means of a peripheral seal (80) made from thermally insulating material, for example from ceramics.

8. The heat exchanger as claimed in one of claims 1 to 7, characterized in that said line (8) has a substantially rectangular cross section, the large sides of which extend parallel to the planes of said deflection plates (7a, 7b).

9. The condensation heat exchanger as claimed in one of claims 1 to 8, characterized in that the tube bundle (2a) acting as primary exchanger has an axial length

substantially greater than that of the tube bundle (2b) acting as secondary exchanger.

10. The heat exchanger as claimed in one of claims 1 to 9, characterized in that it is fitted in order to allow the circulation and heating of a single fluid, in particular cold water, inside the tube(s) forming said bundles (2a, 2b).

11. The heat exchanger as claimed in one of claims 1 to 9, characterized in that it is fitted in order to allow the circulation and heating of at least two different fluids circulating separately inside the tubes forming said bundles (2a, 2b).

12. The heat exchanger as claimed in claim 11, characterized in that it is fitted in order to allow the circulation and heating of two different fluids circulating separately, one inside the tube(s) forming the bundle (2a) acting as primary exchanger, the other inside the tube(s) forming the bundle (2b) acting as secondary exchanger.